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POSTIMMIGRATION INVESTMENTS IN EDUCATION: A STUDY OF IMMIGRANTS IN THE NETHERLANDS*

FRANK VAN TUBERGEN AND HERMAN VAN DE WERFHORST

We use a unique data source to examine postimmigration investments in education among four immigrant groups in the Netherlands. We derive hypotheses from the Immigrant Human Capital Investment model (IHCi), which argues that immigrants' investments are an outcome of settlement intentions, skill transferability, and opportunity costs. The multinomial and ordered logistic regression analyses show that educational investments are stronger among immigrants with higher premigration education, immigrants from former colonies, immigrants who migrated for family reasons, and immigrants who arrived in periods of high unemployment. These findings generally support the IHCi model.

Little research has been done on immigrants' investments in education after migration. Postmigration investments in education and other forms of human capital—most notably language—play a key role in the economic performance of immigrants. Empirical findings show that immigrants' economic performance is positively affected by language acquisition (Chiswick and Miller 1995, 2002; Kossoudji 1988) and by schooling obtained in the host country (Bratsberg and Ragan 2002; Duvander 2001; Friedberg 2000; Zeng and Xie 2004). Despite the importance of human capital investments in language and education, the emphasis in the literature on the causes of such postmigration investments is unbalanced. Although the determinants of language acquisition have been widely examined (e.g., Carliner 2000; Chiswick and Miller 1998, 2001; Espenshade and Fu 1997; Espinosa and Massey 1997; Van Tubergen and Kalmijn 2005), very few studies have investigated the causes of postimmigration investments in formal education. Exceptions are two studies conducted on immigrants in Australia (Chiswick and Miller 1994; Cobb-Clark, Connolly, and Worswick 2005) and two studies conducted in the United States (Borjas 1982; Hashmi 1987; Hashmi-Khan 1997).

We make several contributions to the literature on postmigration investments in education. First, we explore the potential role of macroeconomic conditions at arrival. Although macro-level conditions have been examined with respect to immigrants' economic assimilation (Chiswick, Cohen, and Zach 1997; McDonald and Worswick 1998, 1999), no studies have addressed this factor with respect to immigrants' education.

Second, we include direct measures of postmigration schooling. Borjas (1982) and Hashmi (1987) estimated postmigration schooling indirectly, using information on year of migration and total years of schooling. They calculated postimmigration schooling as total education minus preimmigration schooling, on the assumption that individuals attend school continuously from age six. Such a measure may lead to systematic measurement error of both a crucial independent variable (premigration schooling) and the dependent variable (postmigration schooling). For example, an immigrant who has attended five years of education in his country of origin (i.e., from age 6 to 10), migrated at age 25, and then attended school for five more years in the country of destination (i.e., from age 25 to 30) is

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estimated to have attended 10 years of education in the country of origin and not to have obtained any education after migration. Having separate questions on premigration schooling and postmigration schooling, as in our study, is thus of pivotal importance.

A third contribution is that we look more closely than other studies at educational outcomes. We examine whether immigrants, after arrival, attended no school at all, completed school unsuccessfully, or finished school successfully. In addition, we study the level of education successfully obtained.

Fourth, we examine postmigration investments in the Netherlands, which differs from Australia and the United States because of its system of multiple educational tracks differentiated by level and content. Furthermore, the Netherlands, like many European countries, includes a large immigrant population from former colonies as well as labor migrants, or so-called guest workers (Castles and Miller 2003). Examining postmigration investments in the Netherlands might challenge findings observed earlier in Australia and the United States.

The data we use are from a repeated cross-sectional survey of four large immigrant groups in the Netherlands: Surinamese, Dutch Antilleans, Turks, and Moroccans. Because Suriname and the Dutch Antilles were former colonies from the Netherlands, migration from these countries to its former colonial parent is quite common. By contrast, the Turks and Moroccans predominantly migrated to the Netherlands as male guest workers in the 1960s, followed by family reunion and family formation in the 1970s. We pool the surveys that were conducted in 1988, 1991, 1994, 1998, and 2002. The surveys were designed to study immigrants from the four minority groups. They contain large samples of each group, they have been translated into the minority language, and bilingual interviewers have been used.

THEORY AND HYPOTHESES

To understand postmigration investments in education, we rely on the Immigrant Human Capital Investment (IHCI) model, developed by Duleep and Regets (1999, 2002). This is a simple two-period model of human capital investments:

$$\max \{w\tau_{M1}H_s(1 - \theta) + w\rho[\tau_{M2}H_s + \gamma f(H_s, \tau_{P1}, \theta)]\},$$

where w is the market rate of return on a unit of human capital, τ_{M1} is the proportion of origin-country human capital initially valued in the labor market of the destination country, H_s is the immigrants' initial stock of human capital produced in the home country, θ is the proportion of initial human-capital market value forgone as a result of investment in the host country, ρ is the probability of staying in the host country, τ_{M2} is the proportion of origin-country human capital valued in the second period, and τ_{P1} is a transferability parameter in the production for new human capital. The human capital production function is denoted $\gamma f(H_s, \tau_{P1}, \theta)$, where f is a positive function of θ , H_s , τ_{P1} and of γ , which is a human-capital productivity coefficient varying across individuals. The optimal investment decision, θ^* , maximizes total earnings over the two periods.

Central to the IHCI model are the mechanisms on settlement intentions, skill transferability, and opportunity costs. We use these three mechanisms to derive a series of hypotheses, although we do not examine the mechanisms directly. We assess the empirical evidence of the model indirectly by looking at determinants, such as age at migration, length of stay, ethnic origin, and premigration education.

Settlement Intentions

One important factor in the model is ρ , indicating the probability of staying in the host country. It is argued that investing in host-country-specific education is more attractive when immigrants intend to stay in the host country (Duleep and Regets 1999). For permanent

immigrants, the time periods in which they could use their newly obtained educational qualifications are naturally longer than for sojourners.

The first way we examine the role of settlement intentions is by looking at the impact of length of stay. We assume that commitments to the receiving nation gradually increase over time because of the development of friendships and increasing participation in organizations and institutions. Thus, Hypothesis 1 is that length of stay positively affects investment in postmigration schooling. Second, we examine settlement intentions more directly by looking at the presence of a partner. We assume that immigrants who are married after migration have more attachments to the receiving country and are therefore more likely to stay permanently in that country than those who are single or who married before migration. Hypothesis 2 therefore states that immigrants who marry after migration invest more in school than migrants who are single or married before migration. Third, we examine the role of settlement intentions by looking at age at time of migration. We study immigrants who arrived when they were older than 18 years, and we assume that younger immigrants will spend a longer period in the host country than immigrants who arrive at an older age. We therefore expect that investing in education after migration is more attractive for younger immigrants (Hypothesis 3).

Skill Transferability

A second important mechanism in the IHCI model is that the human capital of immigrants may not be fully transferable to the receiving country (Chiswick 1978). This element is incorporated by τ_{M1} (the proportion of origin-country human capital initially valued in the labor market of the destination country) and by τ_{M2} (the proportion of origin-country human capital valued in the second period). In their theoretical model, Duleep and Regets (2002) also added a transferability parameter τ_{p1} in the production for new human capital. Thus, an immigrants' initial stock of human capital may not fully transfer to the host country labor market (τ_{M1}) and to the production of new, destination-country human capital (τ_{p1}).

We first test the role of transferability by looking at premigration education. In most human capital models, prior education has an ambiguous effect upon investment decisions, increasing both opportunity costs and the productivity of time spent investing (Rosen 1976; Van Smoorenburg and Van der Velden 2000). However, in the IHCI model, low skill transferability reduces the opportunity cost of human capital investment more than it reduces productivity (when $\tau_M < 1$, τ_M is always less than τ_P). Because it can be reasonably assumed that $\tau_M < 1$ for all immigrants, origin-country human capital is more valuable in learning than in earning. We test this idea by looking at the education obtained in the country of origin, hypothesizing that highly skilled migrants invest more in schooling than poorly skilled migrants (Hypothesis 4).

Investments in education are assumed to be more beneficial for those who experience problems in the portability or transferability of their skills (Friedberg 2000; Hashmi 1987). Duleep and Regets (2002) argued that as labor market transferability (τ_M) falls, the transference of origin-country human capital to the production of new skills (τ_P) falls less. According to Duleep and Regets (2002), whatever portion of origin-country human capital transfers to the labor market is also useful in the production of destination-country human capital. Furthermore, origin-country human capital that is not valued in the destination country's labor market is still useful in producing new human capital.

We study this argument by looking at differences across both migration motives and ethnic groups. We assume that labor migrants are better prepared for the labor market than family migrants; thus we predict more investments in education among family migrants (Hypothesis 5). Labor migrants are the least likely to invest in education because they moved for economic reasons. By contrast, family migrants joined their family or migrated for reasons of marriage, and are therefore less well prepared to participate in the labor market in the host country.

Considering ethnic differences, we distinguish between immigrants from former Dutch colonies and immigrants from Turkey and Morocco. Immigrants who come from countries with a different official language and who experience a different educational system than the host country might profit in particular from investing in education after migrating (Duleep and Regets 1999). Because Suriname and the Dutch Antilles were former colonies of the Netherlands, many immigrants from these countries speak Dutch upon arrival. Additionally, the school systems of Suriname and the Dutch Antilles are quite similar to the school system of the Netherlands. By contrast, immigrants from Turkey and Morocco have more limited knowledge of Dutch at arrival, and their educational skills are valued less because of transferability problems. Schooling in the Netherlands should be especially attractive for them because they can learn Dutch and acquire the appropriate diploma. Thus, we hypothesize that migrants from Turkey and Morocco are more likely to invest in schooling than migrants from Suriname or the Dutch Antilles (Hypothesis 6). Given the problems of skills transferability of the migrants of Mediterranean origin, we further hypothesize that the relationship between pre- and postmigration schooling is stronger among Turkish and Moroccan migrants than among Surinamese and Antilleans (Hypothesis 7).

Opportunity Costs

A third mechanism of the IHCI model concerns the role of opportunity costs. We test this idea by a previously overlooked factor: the impact of macro-level conditions at arrival. Although some attention has been given in the literature to the impact of macroeconomic conditions on the economic assimilation of immigrants (Chiswick, Cohen, and Zach 1997; McDonald and Worswick 1998, 1999), we know of no studies that have addressed this issue with respect to immigrants' education. More generally, the impact of macro-level economic conditions on educational decision making is rarely analyzed. A few studies, using data on the entire (native and immigrant) population, have shown that the unemployment rate has a positive impact on educational enrollment (Card and Lemieux 2000; Gustman and Steinmeier 1981). Concerning migrants, one would expect that when immigrants arrive in a period of favorable macroeconomic conditions, opportunity costs are higher and immigrants would be less likely to invest in education (Hypothesis 8). Such educational investment decisions would be more affected by employment conditions for immigrants than for natives because the repercussions of changes in economic conditions are greater for them: namely, the last hired, the first fired. Similarly, immigrant groups can be expected to vary with regard to the impact of the unemployment rate on educational enrollment. Immigrant groups that have more difficulties finding employment (i.e., Turks and Moroccans) are expected to be more strongly affected by the unemployment rate than immigrant groups with lower levels of unemployment (i.e., Surinamese and Antilleans; Hypothesis 9).

DATA AND METHODS

Data

We test our hypotheses by using five repeated cross-sectional survey data sets from the Netherlands: the Social Position and Use of Services of the Immigrant (SPVA) population surveys of 1988, 1991, 1994, 1998, and 2002. These surveys were designed to study immigrants and were used in previous work on a variety of topics (e.g., Van Ours and Veenman 2003). They contain large samples of immigrants, have been translated into the minority language, and have used bilingual interviewers. The data are (almost) nationally representative of the four largest immigrant groups in the Netherlands: Turks, Moroccans, Surinamese, and Dutch Antilleans.¹ We limit our analysis to the foreign-born population

1. The sample frame consisted of regions with a larger share of immigrants, leading to an overrepresentation of immigrants living in the more ethnically concentrated, urban areas.

that migrated to the Netherlands between the ages of 18 and 64. We do not examine immigrants who arrived at an earlier age because previous research has shown that educational investments are qualitatively different for children than for adults (Chiswick and DebBurman 2006). We restricted our sample to men because most variables are available only for the heads of households. The SPVA data are exceptionally rich for our purposes. Most importantly, the data contain direct information on premigration schooling and direct information on postmigration schooling. This is a major advantage compared with earlier studies of Hashmi (1987) and Borjas (1982).

Dependent Variables

Another asset of the data we use is that they allow a more detailed examination of the dependent variable: education. Rather than focussing at years of schooling (as was done in most previous research), we look at several educational outcomes. First, we examine whether immigrants attended school in the Netherlands and, if so, whether they successfully completed their education (i.e., received a diploma). Immigrants who arrive in periods of high unemployment might be more likely to attend school in the Netherlands, but that does not necessarily mean that they will be more likely to finish their education successfully (e.g., economic conditions might have improved while at school). These and other decision-making processes are important to study. Our first dependent variable therefore has the outcomes (0) no schooling in the Netherlands, (1) uncompleted schooling, and (2) completed schooling. To compare our results with previous work and to see whether our results are sensitive to classifications, we also present the results of an additional analysis in which we group the categories of uncompleted and completed schooling.

Second, conditional on having successfully completed schooling in the host country, we study educational attainment. The highest educational level is measured in four categories: (1) lower secondary level (not giving access to tertiary education), (2) upper secondary level (giving access to tertiary education), (3) tertiary vocational college, and (4) university. This measure is preferred to years of study as an indicator of educational attainment because the highly differentiated Dutch educational system grants different years for reaching the same level of schooling. For instance, vocational college may be entered after five years of upper secondary general education but also after four years of lower secondary school in combination with three to four years intermediate vocational schooling at the upper secondary level.²

Independent Variables

The following independent variables are used. First, we examine country of origin: Turkey, Morocco, Suriname, and the Dutch Antilles. The SPVA surveys were specifically aimed to study these groups and to exclude other migrant groups. Premigration education is measured in years, ranging from zero to 20.³ Age at migration and years since migration are

2. The two equations on educational participation and achieved level of schooling are likely to have correlated error terms because various unobserved characteristics may affect both outcomes (e.g., ambition, intelligence). Such correlated error structures can be analyzed with selection models in which one variable (educational participation) is a selection variable that determines the observation of the second dependent variable (e.g., Heckman 1979). We estimated a Heckman selection model following this procedure, with any postmigration education as the selection variable. In the selection model, the predictors were years since migration (and its squared term), age at migration (and its squared term), marriage timing, migration motive, and unemployment rate. In the model predicting level of acquired schooling, the predictors were premigration years of schooling, ethnic group, and the interaction between these predictors. The findings of these models are similar to the results we present. An important reason to maintain two separate equations is that selection models cannot properly deal with multiple outcomes in the selection variable or with ordered outcomes in the outcome variable.

3. In the 1991 and 1994 data sets, no direct measure of years of schooling prior to migration was available and needed to be computed on the basis of levels of acquired schooling. We tested whether premigration years of schooling had a differential effect on educational investments across survey years, but this was not the case. We

Table 1. Immigrants' Postmigration Investments in Education in the Netherlands, by Migration Cohort

Variable	Year of Migration				Total
	1947–1965	1966–1979	1980–1990	1991–2002	
Total (<i>N</i>)	696	4,555	2,576	871	8,698
Educational Participation in the Netherlands					
No schooling (%)	79.2	85.7	71.8	68.0	79.3
Uncompleted schooling (%)	6.3	6.6	16.6	21.0	11.0
Completed schooling (%)	14.5	7.6	11.6	11.0	9.7
Total	100.0	99.9 ^a	100.0	100.0	100.0
Level of Completed Schooling in the Netherlands					
Lower secondary (%)	23.8	34.8	25.0	21.9	28.5
Upper secondary (%)	30.7	31.0	36.7	39.6	34.0
Vocational college (%)	28.7	22.1	28.3	25.0	25.4
University (%)	16.8	12.1	10.0	13.5	12.1
Total	100.0	100.0	100.0	100.0	100.0

^aTotal does not sum exactly to 100% because of rounding.

measured in years. Because earlier studies found some evidence for curvilinear relationships, we include quadratic terms for both age at migration and length of stay. Migration motive is classified into four groups: for work, study, family reasons (i.e., marriage, family reunion), and other motives. As for marital status, we distinguish those who are (and always have been) single, those who were married before migration, and those who were married after migration. Because the marriage date was not included in the 1988 and 1991 surveys, we add a category for people who were married but for whom the date was not known. This means that the effect of marriage timing is based on the surveys conducted in 1994, 1998, and 2002. We include the national unemployment rate in the year of migration, based on official data on registered unemployment and volume of the labor force in full-time years (Statistics Netherlands 2006).⁴

The Appendix presents descriptive statistics of the independent and dependent variables.

RESULTS

Table 1 presents an overview of educational investments of immigrants by migration year, grouped into four cohorts. Of the 8,698 immigrants in our sample, about 20% participated in the Dutch school system, of whom more than 50% were unsuccessful in obtaining a diploma. In the lower panel of Table 1, we see that among those who completed their postmigration schooling, almost 30% obtained lower secondary education, about 34%

also examined the effect of premigration education measured in education categories, but the results were similar to premigration years of schooling. Further, survey year is omitted because including this variable did not alter the results that we present here.

4. The unemployment rate can be calculated for our data from 1947 onward, much longer than the period for which official unemployment rates are available based on the actual labor force instead of its equivalent in full-time years (from 1969). Using the official unemployment rate would thus leave out a substantial number of immigrants who migrated in the 1960s, the decade in which large-scale immigration to the Netherlands started. Note that the correlation between the official unemployment rate and our measure is .97. The effect size of unemployment rate on our dependent variables is slightly underestimated.

received an upper secondary diploma, and more than 35% obtained tertiary education (i.e., vocational college or university).

We also find important differences across immigrant cohorts, which have not been observed in previous studies relying on a single cross-sectional survey. Our findings show that immigrants who arrived in the Netherlands in the period 1966–1979 made fewer investments in schooling than immigrants who arrived before or after that time. Among the immigrants who came between 1966 and 1979, less than 15% attended school in the Netherlands. Furthermore, among those who completed a grade level, almost 35% did so at the lower secondary level. Our results show that earlier cohorts were more likely to complete their school than more recent cohorts. One reason for this finding is that more recently arrived immigrants have had less opportunity to complete their education.

Table 2 presents the results of the multinomial logistic regression of educational participation (Models 1 and 2). We also present the results of a binary logistic regression with both schooling outcomes (uncompleted and completed) grouped together (Model 3). Table 3 shows the results of ordered logit models (Cameron and Heckman 1998; Long 1997) predicting the highest level of completed schooling, conditional on having obtained a diploma in the Netherlands. To conserve space, we describe the results of both tables simultaneously. We assume that postmigration investments are the highest when immigrants completed their education, somewhat less high when they attended school in the Netherlands but did not obtain a diploma, and the lowest when they did not participate in the Dutch school system at all. Similarly, we assume that among immigrants who obtained a diploma, those with the highest education invested most.

Settlement Intentions

In line with Hypothesis 1, and similar to previous findings (Chiswick and Miller 1994; Cobb-Clark et al. 2005; Hashmi 1987), length of stay in the host country has a positive effect on educational investments. We find that immigrants who have been in the Netherlands longer have made more investments in education, and this effect is particularly pronounced for the first few years after migration. Table 2 (Model 2) shows that the number of years since migration has a negative impact on the odds of uncompleted postmigration schooling. With regard to completed schooling, the effect is positive and curvilinear. Taken together, these results suggest that immigrants become more successful in completing their studies with a longer duration of stay in the host country and have been increasingly moving away from the uncompleted education category. In other words, it takes a few years for migrants to make the transition from school enrollment to obtaining an educational qualification. Observing this difference between uncompleted and completed schooling would not have been possible when relying on Model 3.

We also examine the role of the partner. We hypothesized that immigrants who married after migration make more investments in education than those who were married before migration and those who remained single (Hypothesis 2). We find no support for this hypothesis, however. No significant differences exist between these categories of marital status.

In line with the mechanism on settlement intentions is the finding that age at migration has a negative effect on postmigration investments in education (Hypothesis 3). This has been observed in earlier studies as well (Chiswick and Miller 1994; Hashmi 1987). Model 1 of Table 2 shows that age at migration has a significantly negative (nonlinear) effect on the odds of having unsuccessfully invested in postmigration education compared with not having attended school after migration. Model 1 of Table 2 furthermore shows that age at migration has a significant negative linear effect on the odds of completing education in the Netherlands. Taken together, this means that the likelihood of having successfully or unsuccessfully attended education in the Netherlands decreases with the age of migration, and that the decrease in unsuccessful educational attendance is slightly steeper for those

Table 2. Multinomial and Binomial Logistic Regression of Immigrants' Postmigration Educational Participation in the Netherlands

Variable	Model 1		Model 2		Model 3, Uncompleted and Completed
	Uncompleted Schooling vs. No Schooling	Completed Schooling vs. No Schooling	Uncompleted Schooling vs. No Schooling	Completed Schooling vs. No Schooling	Uncompleted vs. No Schooling
Ethnic Group (relative to Turks)					
Moroccans	0.894** (7.48)	0.777** (4.98)	0.405 (1.33)	0.632 (1.47)	0.528* (2.10)
Surinamese	1.520** (10.93)	2.175** (13.80)	2.153** (6.48)	3.659** (9.04)	2.773** (10.36)
Antilleans	1.943** (13.46)	2.589** (15.76)	2.112** (5.69)	4.333** (10.14)	3.107** (10.32)
Premigration Education (years)	0.098** (11.62)	0.149** (15.60)	0.095** (4.90)	0.199** (8.35)	0.136** (8.63)
Age at Migration	-0.159** (4.44)	-0.107* (2.43)	-0.152** (4.25)	-0.103* (2.34)	-0.133** (4.36)
Age at Migration, Squared	0.001* (2.07)	0.000 (0.61)	0.001 (1.96)	0.000 (0.55)	0.001 (1.72)
Migration Motive (relative to work)					
Education	1.881** (14.35)	1.895** (13.60)	1.823** (13.78)	1.802** (12.96)	1.810** (16.19)
Family	0.397** (3.28)	0.795** (5.69)	0.309* (2.54)	0.630** (4.45)	0.454** (4.55)
Other	0.175 (1.32)	0.117 (0.81)	0.151 (1.14)	0.036 (0.25)	0.101 (0.96)
Unemployment Rate in Migration Year	0.008 (0.44)	0.087** (4.26)	0.012 (0.36)	0.144** (3.73)	0.068** (2.60)
Years Since Migration	-0.062** (4.05)	0.095** (5.40)	-0.060** (3.97)	0.097** (5.53)	-0.006 (0.48)
Years Since Migration, Squared	0.001 (1.51)	-0.001** (3.04)	0.001 (1.33)	-0.001** (3.26)	0.000 (0.27)

(continued)

who arrived at a younger age. The level of completed postmigration schooling is not affected by age at migration, conditional on having completed any form of education in the Netherlands.

Skill Transferability

In line with Hypothesis 4, we find that immigrants who obtained higher levels of schooling prior to migration have a higher chance of enrolling and completing education in the Netherlands (Table 2). If they obtain a diploma, it is of a higher level (Table 3). The odds of having been enrolled in but not completing postmigration schooling versus no postmigration schooling increase with a factor of ($e^{0.098} =$) 1.10 for each additional year of premigration schooling. The odds of completion increase by a factor of 1.16 with every additional year of schooling prior to migration. Apparently, the more selective the outcome, the stronger the support is for a complementary relationship between pre- and postmigration schooling. Our

(Table 2, continued)

Variable	Model 1		Model 2		Model 3, Uncompleted and Completed
	Uncompleted Schooling vs. No Schooling	Completed Schooling vs. No Schooling	Uncompleted Schooling vs. No Schooling	Completed Schooling vs. No Schooling	Uncompleted vs. No Schooling
Marriage Timing (relative to being single)					
Married premigration	0.263 (1.76)	-0.116 (0.66)	0.260 (1.74)	-0.110 (0.63)	0.120 (0.96)
Married postmigration	0.071 (0.60)	0.011 (0.09)	0.048 (0.42)	-0.030 (0.25)	0.021 (0.21)
Married, date unknown (1988, 1991)	-0.350** (2.96)	-0.209 (1.66)	-0.360** (3.05)	-0.216 (1.73)	-0.301** (3.04)
Ethnic Group \times Years of Schooling in Origin Country					
Moroccans \times years			0.001 (0.02)	0.003 (0.09)	-0.003 (0.17)
Surinamese \times years			-0.042 (1.63)	-0.094** (3.25)	-0.055** (2.63)
Antilleans \times years			0.028 (0.97)	-0.101** (3.20)	-0.025 (1.05)
Ethnic Group \times Unemployment Rate					
Moroccans \times unemployment rate			0.085* (2.19)	0.03 (0.63)	0.067* (2.15)
Surinamese \times unemployment rate			-0.057 (1.37)	-0.11* (2.42)	-0.092** (2.77)
Antilleans \times unemployment rate			-0.087* (2.14)	-0.131** (2.95)	-0.118** (3.57)
Constant	-0.200 (0.34)	-4.184** (5.91)	-0.252 (0.40)	-5.002** (6.55)	-1.387** (2.62)
Pseudo R^2	0.31		0.31		0.37

Notes: Absolute value of z statistics are shown in parentheses. $N = 8,698$.

* $p < .05$; ** $p < .01$

findings are in line with those of Chiswick and Miller (1994) and Cobb-Clark et al. (2005). Borjas (1982) and Hashmi (1987) reported a negative relationship, but these studies used indirect measures of pre- and postmigration education. Again, this shows the importance of relying on direct measures of pre- and postmigration education.

In summary, strong evidence exists of a positive effect of premigration education on postmigration education. This finding generalizes earlier findings among the general (i.e., native and migrant) population on the complementarity of different types of skills acquisition, such as between initial schooling and on-the-job training (Brunello 2004; Van Smoorenburg and Van der Velden 2000).

We further test the skill transferability mechanism by investigating the effect of migration motives. As expected, we find that immigrants moving to the Netherlands for work reasons are the least likely to invest in education. They less often participate in schooling; and, among those who do obtain a diploma, many obtain the lowest level of schooling.

Table 3. Ordered Logit Regression of Immigrants' Postmigration Completed Educational Level in the Netherlands

Variable	Model 1	Model 2
Ethnic Group (relative to Turks)		
Moroccans	-0.574* (2.10)	-0.292 (0.33)
Surinamese	-0.704** (2.79)	0.504 (0.65)
Antilleans	-0.668** (2.62)	1.159 (1.50)
Premigration Education (years)	0.143** (8.38)	0.251** (4.28)
Age at Migration	-0.093 (1.27)	-0.105 (1.42)
Age at Migration, Squared	0.002 (1.25)	0.002 (1.36)
Migration Motive (relative to work)		
Education	1.436** (7.35)	1.371** (6.96)
Family	0.125 (0.54)	0.049 (0.21)
Other	0.321 (1.44)	0.262 (1.16)
Unemployment Rate in Migration Year	0.043 (1.46)	0.045 (1.50)
Years Since Migration	0.015 (0.57)	0.012 (0.45)
Years Since Migration, Squared	0.000 (0.31)	0.000 (0.49)
Marriage Timing (relative to being single)		
Married premigration	0.13 (0.47)	0.111 (0.40)
Married postmigration	-0.064 (0.39)	-0.100 (0.60)
Married, date unknown (1988, 1991)	-0.040 (0.22)	-0.030 (0.17)

(continued)

People migrating to the Netherlands for family reasons invest significantly more in education than in labor migrants. Migrants who migrated to improve their educational career are the most likely to invest in postimmigration education (Hypothesis 5). Our results show that educational migrants not only are the most likely to enroll in school (Table 2) but also obtain higher levels of schooling (Table 3). The odds of educational enrollment are about six times as high among immigrants who move to pursue their educational career than among labor migrants.

Considering country of origin, the skill transferability mechanism predicts that Turks and Moroccans (who originate from a country with a different language and school system) are more likely to invest in education than Surinamese and Antilleans. Contrary to

(Table 3, continued)

Variable	Model 1	Model 2
Ethnic Group \times Years of Schooling in Origin Country		
Moroccans \times years		-0.028 (0.39)
Surinamese \times years		-0.104 (1.64)
Antilleans \times years		-0.165** (2.58)
Thresholds		
First	-0.190	0.780
Second	1.520	2.520
Third	3.200	4.210
Pseudo R^2	0.09	0.09

Notes: To keep the model parsimonious, we omit the insignificant interaction between ethnic group and unemployment rate from Model 2. Absolute values of z statistics are shown in parentheses. $N = 845$.

* $p < .05$; ** $p < .01$

Hypothesis 6, however, we find that immigrants from Suriname and the Dutch Antilles make more investments in education than Turks and Moroccans, even after we control for migration motives. For instance, the odds of enrolling in uncompleted postmigration schooling for Dutch Antilleans is almost three times higher than for Moroccans ($e^{1.943 - 0.894} = 2.85$) and about seven times higher than for Turks ($e^{1.943} = 6.98$). Interestingly, ethnic differences are even larger with regard to completed schooling. For example, the odds of having obtained a Dutch educational qualification among Dutch Antilleans is more than six times higher than for Moroccans and about 13 times higher than for Turks. These results suggest that Turkish and Moroccan immigrants more often fail to successfully complete their initiated schooling. Among those who obtained a diploma in the Netherlands, there are no ethnic differences, all things being equal, with regard to highest level of completed schooling (Table 3). Hashmi (1987) and Cobb-Clark et al. (2005) found that non-English-origin groups (comparable with the Turks and Moroccans that we study) are more likely to invest in education after migration than immigrants more similar to the residents of the host country. Chiswick and Miller (1994) do not find differences by language origin.

We find support for the hypothesized interaction between ethnic group and premigration education (Hypothesis 7). The interactions between Surinamese and Dutch Antilleans with premigration schooling are negative for completing schooling (Model 2, Table 2) and for educational attainment (Model 2, Table 3). Premigration education is less relevant for investments in postmigration schooling among Surinamese and especially among Antillean immigrants than among the Turks and Moroccans.

Opportunity Costs

We find evidence for the hypothesis that immigrants who arrive in times of high unemployment invest more in school (Hypothesis 8).⁵ When immigrants arrive in periods of

5. We further analyzed the impact of the unemployment rate at arrival using models that control for the correlated error terms within migration years (a random intercept model and a model using robust standard errors). Because these models give very similar estimates of the coefficients and standard errors, we present the results of models without controls for clustering.

high unemployment, they have higher odds of completed schooling (compared with no schooling).⁶ However, the unemployment rate is not associated with unsuccessful participation in school and no school attendance. In other words, those who migrated to the Netherlands during an economic dip are more likely to obtain a diploma and less likely to either participate in school unsuccessfully or not attend school at all. Macroeconomic conditions do not have the same effect across ethnic groups. In line with Hypothesis 9, the impact of the unemployment level at arrival is particularly pronounced among the more vulnerable ethnic groups. The completion of schooling by Turks and Moroccans, who have high unemployment rates, is clearly affected by the unemployment rate. Comparatively, for Surinamese and Antilleans, who find employment more easily, the effect is close to zero (Model 2, Table 2).⁷

CONCLUSION AND DISCUSSION

Despite the importance of postmigration education for the economic performance of immigrants (Bratsberg and Ragan 2002; Duvander 2001; Friedberg 2000; Zeng and Xie 2004), few studies have examined the determinants of such investments. The reason for this omission is clear: very few data sets contain reliable information on where adult immigrants (i.e., those who migrated after age 18) obtained their education. In this article, we use direct measures of pre- and postmigration education, examine educational outcomes in more detail than before, demonstrate the role of a previously overlooked factor (i.e., macroeconomic conditions at arrival), and study nonstudied country—the Netherlands—that is typical of many Western European countries.

Drawing on large-scale surveys of male immigrants from Turkey, Morocco, Suriname, and the Dutch Antilles who migrated between ages 18 and 65, we conducted multinomial and ordered logit regression analyses that generally support the IHCI model developed by Duleep and Regets (1999, 2002). This theoretical model argues that postmigration investments are an outcome of three main mechanisms: settlement intentions, opportunity costs, and skill transferability. Although our study, like previous research, does not provide a direct test of the IHCI theory, a number of hypotheses were derived from them, thus yielding an indirect test. In line with expectations, we find that postmigration investments in education are a positive function of premigration education, length of stay, and unemployment rate in the year of arrival. In addition, educational investments are higher among immigrants who migrated at a younger age and among family migrants as compared with labor migrants. On a more general theoretical level, our study thereby confirms the idea that immigrants are more likely to invest in education after migration when they intend to stay permanently, when their opportunity costs are lower, and when their origin skills are more difficult to transfer to the host-country labor market.

Despite the overall evidence for the IHCI model, one empirical finding of our study is surprising and deserves further discussion. Contrary to expectations, immigrants from former Dutch colonies (i.e., Suriname and the Dutch Antilles) make more investments in education than immigrants from Turkey and Morocco. This is unexpected, for two reasons:

6. Further analysis shows that differences in the unemployment rate at arrival partially explain cohort differences in educational investments. This conclusion is based on the results of a multilevel, random intercept model (Raudenbush and Bryk 2002) with individuals ($N = 8,698$) at the lower level and year of migration at the higher level ($N = 54$). We estimated a multilevel logit model, using the predictive quasi-likelihood (PQL) second-order approximation procedure (Rasbash et al. 2005). With “completed any schooling” as the dependent variable, we find a random variance of 0.4093 ($SE = 0.0995$) at the cohort level. After we add the unemployment rate at arrival, the residual variance at the cohort level significantly decreases, to 0.3387 ($SE = 0.0844$). Our full model (i.e., including unemployment at arrival, schooling abroad, age at migration, length of stay, marriage timing, ethnicity, and migration motive) entirely explains intercohort differences in educational investments (i.e., residual variance at the cohort level becomes 0.0010, $SE = 0.0094$).

7. We further tested interaction effects for age at migration, marriage timing, and premigration education with the aggregate unemployment rate, but none of these were statistically significant.

(1) many immigrants from Suriname and the Dutch Antilles speak the Dutch language upon arrival, and (2) the educational system in Suriname and the Dutch Antilleans more closely resembles that of the Netherlands. As a result, the skills of these former colonial groups are more readily transferable to the Dutch labor market than those of Turks and Moroccans, leading one to expect fewer investments in education.

One explanation of the higher investments among Surinamese and Antillean immigrants is that they intend to stay in the Netherlands, as opposed to the so-called guest workers from Turkey and Morocco. However, this explanation is less plausible because the term *guest worker* was used by the government (not by the immigrants themselves). Moreover, Turks and Moroccans would be more likely to stay because they came from poorer areas than immigrants from the more economically developed former colonies.

A more plausible explanation for our finding is that Turks and Moroccans have not only less-transferable skills than former colonial migrants for the labor market (τ_M) but also a disadvantage that is even larger with respect to skill transferability for education (τ_P). This idea would modify Duleep and Regets's (2002) assumption that low skill transferability reduces the opportunity cost of human capital investment more than it reduces its productivity (when $\tau_M < 1$, τ_M is less than τ_P); they suggested that as labor market transferability (τ_M) falls, the transference of origin-country human capital to the production of new skills (τ_P) always falls less. According to Duleep and Regets (2002), whatever portion of origin-country human capital transfers to the labor market, that portion is also useful in the production of destination-country human capital. Furthermore, they argued that origin-country human capital that is not valued in the destination country's labor market is still useful in producing new human capital. They mentioned the roles of innate productivity, learning skills, and similarity and common elements between old and new skills, which would be useful in producing new human capital but more difficult to transfer to the labor market.

However, one reason to believe that τ_M could be *larger* than τ_P is that the skill requirements for the educational system are sometimes higher than for the labor market. To perform well at school in a new country, one needs to have sufficient command of the host-country language and to possess the appropriate educational qualifications and knowledge in the absence of specific schools for adult immigrants to ease the educational transition. Unlike immigrants from former colonies, many Turks and Moroccans had no knowledge of Dutch when they arrived as adults, and their knowledge and skills did not fit smoothly into the educational system in the Netherlands. However, the skills of Turks and Moroccans were easily transferable to the lower segments of the labor market—for example, heavy industry—for which no Dutch language skills and no appropriate educational qualifications were required. Theoretically, these arguments imply that the IHCI model needs to relate the notion of transferability to the required skills in the occupational structure and to the required skills in the educational system; the model also needs to consider that in some cases, transferability problems particularly limit possibilities of postmigration investments in education. From a social policy perspective, our study directs attention to the institutional barriers that hamper immigrants' use of their premigration knowledge and skills in the successful pursuit of education in their new home country.

Appendix Table A1. Descriptive Statistics of Independent and Dependent Variables

Variables	Minimum	Maximum	Mean (or %)	SD
Independent Variables				
Age at migration	18	64	26.44	6.94
Unemployment rate in migration year	0.47	12.68	4.30	3.28
Years since migration	0	54	16.40	9.30
Premigration education (years)	0	20	6.21	5.31
Ethnic group				
Turks			34.2	
Moroccans			36.1	
Surinamese			16.9	
Antillean			12.8	
Migration motive				
Work			55.4	
Education			11.7	
Family			17.6	
Other			15.3	
Marriage timing				
Single			16.9	
Married premigration			19.7	
Married postmigration			26.8	
Married, date unknown (1988, 1991)			36.6	
Dependent Variables				
Educational participation				
Not at all			79.3	
Uncompleted			11.0	
Completed			9.7	
Highest level of completed postmigration education				
Lower secondary			28.5	
Upper secondary			34.0	
Vocational college			25.4	
University			12.1	

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